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MODERN TRENDS IN MAPPING

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Abstract

The current technological advancement has brought with it new methods, new equipment and data that can be used in the process of map production.

The development of earth resources technology satellites as well as transit satellites for satellite positioning techniques using Doppler receiver and GPS surveying equipment now produce accurate control surveys for map production in a short period of time and for less cost as compared to the conventional methods of providing such controls. The availability of satellite imagery of high resolution has made map revision quicker and cheaper than ever before. All these new methods of surveying, aerial photography and photogrammetry have brought about new trends in mapping.

The Regional Centre for Services in Surveying, Mapping and Remote Sensing has implemented several mapping projects using these new methods and has also been conducting courses on these new developments in mapping. One such course which has been very popular is "Modern Trends in Mapping". The course was developed for professionals and technicians involved in map production. In this paper, the contents of the course are discussed and the details of the projects carried out are highlighted. Various outputs so far achieved are listed and evaluated.

I. INTRODUCTION

1. The last two decades have been significant and important technical developments in the whole field of cartographic production embracing geodesy, photogrammetry, cartography, reproduction and printing techniques. This has naturally affected map production methods as well as cost of production of the maps.

2. The introduction of remote sensing technology as a tool for data collection for the compilation and revision of topographical and thematic maps, coupled with the improvement in computer technology for automated mapping, opened new doors to the map production process. However, only a few of the mapping organizations in Africa are able to afford to use the new technologies of remote sensing and automated cartography.

3. Cartography training in the public educational establishments is not yet completely satisfactory because students of cartography at ordinary diploma and first degree level are given sufficient training only in cartography and land surveying, but very little or nothing in remote sensing and automated cartography. Consequently, therefore, the short courses being offered by Geodesy and Aerial Photography and Cartography Departments at RCSSMRS become useful and timely because they have been introduced at the time when some African Governments cannot afford to send their technicians and professionals to overseas institutions to up-date their technical/professional skills.

II. DEVELOPMENT OF THE COURSES

4. During the third Programming Cycle (1982-1986), the International Union of Geodesy and Geophysics (IUGG) and the International Association of Geodesy (IAG) together with the African Association of Cartography approved the African Doppler Survey (ADOS) Project to cover the whole of Africa with Doppler points. The Regional Centre was the executing agency for the project. During the same period 1982-1986, the International Development Research Centre (IDRC) of Canada also funded a Satellite Data Photomapping Project. One important objective contained in the two projects was to design methodologies to be used in achieving results and disseminating these results to other mapping professionals and technicians through training within the Eastern and Southern African subregion. It was the development of these new methodologies and techniques which were put together in the form of training package entitled "Modern Trends in Surveying and Mapping".

A. Modern trends in surveying and mapping

5. In 1984, the Geodesy and Aerial Photography Department gave a training course in Mbabane, Swaziland. The purpose of the course was to provide a forum at which practising surveying technicians could meet and exchange experience through practical techniques in order to up-date their professional knowledge. The same course was mounted again in 1986 in Lusaka, Zambia and in 1987 in Lilongwe, Malawi. During these two courses, the Cartography Department of RCSSMRS was invited to present a short seminar on the methodologies developed and results achieved from the research being carried out in the development of techniques for the use of satellite data in the production and revision of topographical and thematic maps.

6. During the two courses the following were discussed:

- (a) Introduction to electromagnetic distance-measuring methods;
- (b) Establishment of calibration baselines;
- (c) Calibration equipment;
- (d) Review of Doppler surveying methods;
- (e) Electronic theodolites, total stations;
- (f) Review of the electronic computing techniques in surveying and mapping using pocket calculators, microcomputers and mainframe computers;
- (g) Data management and land information systems;
- (h) Digital cartography;
- (i) Satellite data photomapping, including maps revision using various techniques;
- (j) Photogrammetry for cadastral and control surveying, topographical surveying technique;
- (k) The role of the Regional Centre in interregional geodetic surveying projects: Ados Project, AGSN Project and Network Adjustment and Analysis in the subregion.

B. Modern trends in mapping

7. In 1985, the Cartography Department which had by this time started achieving results from the research into the use of satellite data in production of photo maps designed and conducted

a short course entitled "Photomapping using satellite data". Participants at this course were cartographers who were already trained in polytechnics and colleges of technology and already employed in mapping organizations.

8. They were trained in the aspects of the use of satellite imagery/aerial photographs in the revision/production of topographical and thematic maps.

9. The course contents were;

- (a) Introduction to remote sensing;
- (b) Introduction to electromagnetic spectrum;
- (c) Satellite operational parameters;
- (d) The use of satellite data for photomapping;
- (e) Colour compositing, mosaicking of imagery, image density control;
- (f) Densitometry, sensitometry, satellite image quality control;
- (g) Characteristic courses;
- (h) Colour separation, half toning;
- (i) Review of map projection, map projections system used in surveying and mapping in the Eastern and Southern Africa subregion;
- (j) Control for mapping, establishment of horizontal control, the Doppler survey methods;
- (k) Compilation of planimetric details from satellite imagery;
- (l) Scribing of planimetric details, combining of planimetric details with satellite imagery; and
- (m) Cromalin proofing and lithographic press printing.

10. As the two courses developed, it became clear that some of the new skills being acquired by both the surveyors and cartographers were common. It was in the light of this that the titles of the two courses were changed to "Modern Trends in Mapping".

11. The following table shows the attendance at the courses given by both Cartography and Geodesy and Aerial Photography Departments from 1984 to 1989.

TABLE OF ATTENDANCE AT THE COURSES

Country	1984	1985	1986	1987	1988	1989
	GAP CD	GAP CD	GAP CD	GAP CD	GAP CD	GAP CD
Botswana			2	2		
Burundi						
Ethiopia		1 1				
Ghana		2				
Kanya	6	2 8	3	7	6	1
Liberia		2				
Lesotho	4					
Libyan Arab Jamahiriya	1					
Malawi	1	2	3	13		
Mauritius						
Madagascar						
Mozambique	1	2	1			
Nigeria		1				
Rwanda						
Somalia						
Sudan		1 2				
Swaziland	12		3	3		
United Re- public of						
Tanzania	5	2 6	9		4 4	1 1
Uganda	5	2 3	4		2	
Zambia			12	3		
Zimbabwe	1	1 1	1	1		
Zanzibar						
163	35	42	38	35	10	3

GAP = Geodesy and Aerial Photography Department
 CD = Cartography Department

C. Course Evaluation

12. It is the policy of the Regional Centre to evaluate each and every course that is held at the Centre. This way it enables the course co-ordinator and indeed the Centre's management to find out whether the course has achieved the objectives for which it was planned and designed. This is done by course participants themselves who complete confidential course evaluation questionnaire. The following questions were answered by each participant:

- (a) What is your general impression about the course;
- (b) What was the level of your knowledge of the topics covered before the course and after the course;
- (c) To what extent is the course relevant to the needs of your occupation;
- (d) What is your view about the length of the course;
- (e) Was the general organization of the course good or not;
- (f) What was the level of teaching including practical and theory;
- (g) Were the demonstration facilities adequate or not; and
- (h) Comment on every item of topics discussed during the course.

13. The summary of all the answers in the questionnaire was used to review and improve on the general organization and the contents of the course on Modern Trends in Mapping thus making it very popular among professionals and technicians in the map production organizations in the Eastern and Southern African subregion.

D. Course fee

14. Until 1988, a good number of courses at the Regional Centre for Services in Surveying, Mapping and Remote Sensing were sponsored by international and donor organizations and so the courses attracted large number of participants as can be seen from the table of attendants. Since 1988, the Centre has adopted a new policy of revenue generation in order to attain a level of self-sufficiency. The course on Modern Trends in Mapping therefore now attracts a fee of \$US 1,500 excluding pocket allowance, hotel accommodation and other emergencies. This however has affected

course participation. Nevertheless, efforts are being made by the Centre and participants own governments to secure sponsorship for individual participants' who qualify to attend the course at the Centre.

III. CONCLUSION

15. The development of short training courses at the Regional Centre for Services in Surveying, Mapping and Remote Sensing provide answer to one of the objectives for which the Centre was established. From what has been presented above, it is clear that member States in the Eastern and Southern African subregion have benefited from the course on Modern Trends in Mapping organized by the Centre. It is strongly felt that member States from other subregions should also take advantage of this training course in Nairobi.

16. Once the necessary equipment are available, individual countries can request the Regional Centre to mount the courses in their home areas or they can send their trainees to courses specifically designed for them.

17. Experience has so far shown that donors and international organizations are very willing to provide funding for these training courses held in the subregion where large numbers of participants can have the opportunity of benefitting. Thus, member States are urged to contact donor countries and international organizations to provide financial support for their participants to attend these courses at the Regional Centre for Services in Surveying, Mapping and Remote Sensing in Nairobi.